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## Selected Acquisition Report (SAR)

RCS: DD-A&T(Q&A)823-577



### **CH-47F Modernized Cargo Helicopter (CH-47F Block II)**

As of FY 2020 President's Budget

Defense Acquisition Management  
Information Retrieval  
(DAMIR)

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**Table of Contents**

Sensitivity Originator .....	3
Common Acronyms and Abbreviations for MDAP Programs .....	4
Program Information .....	6
Responsible Office .....	6
References .....	7
Mission and Description .....	8
Executive Summary .....	9
Threshold Breaches .....	11
Schedule .....	12
Performance .....	14
Track to Budget .....	15
Cost and Funding .....	15
Low Rate Initial Production .....	29
Foreign Military Sales .....	30
Nuclear Costs .....	30
Unit Cost .....	31
Cost Variance .....	34
Contracts .....	37
Deliveries and Expenditures .....	41
Operating and Support Cost .....	42

## **Sensitivity Originator**

No originator information is available at this time.

## Common Acronyms and Abbreviations for MDAP Programs

Acq O&M - Acquisition-Related Operations and Maintenance  
ACAT - Acquisition Category  
ADM - Acquisition Decision Memorandum  
APB - Acquisition Program Baseline  
APPN - Appropriation  
APUC - Average Procurement Unit Cost  
\$B - Billions of Dollars  
BA - Budget Authority/Budget Activity  
Blk - Block  
BY - Base Year  
CAPE - Cost Assessment and Program Evaluation  
CARD - Cost Analysis Requirements Description  
CDD - Capability Development Document  
CLIN - Contract Line Item Number  
CPD - Capability Production Document  
CY - Calendar Year  
DAB - Defense Acquisition Board  
DAE - Defense Acquisition Executive  
DAMIR - Defense Acquisition Management Information Retrieval  
DoD - Department of Defense  
DSN - Defense Switched Network  
EMD - Engineering and Manufacturing Development  
EVM - Earned Value Management  
FOC - Full Operational Capability  
FMS - Foreign Military Sales  
FRP - Full Rate Production  
FY - Fiscal Year  
FYDP - Future Years Defense Program  
ICE - Independent Cost Estimate  
IOC - Initial Operational Capability  
Inc - Increment  
JROC - Joint Requirements Oversight Council  
\$K - Thousands of Dollars  
KPP - Key Performance Parameter  
LRIP - Low Rate Initial Production  
\$M - Millions of Dollars  
MDA - Milestone Decision Authority  
MDAP - Major Defense Acquisition Program  
MILCON - Military Construction  
N/A - Not Applicable  
O&M - Operations and Maintenance  
ORD - Operational Requirements Document  
OSD - Office of the Secretary of Defense  
O&S - Operating and Support  
PAUC - Program Acquisition Unit Cost

PB - President's Budget  
PE - Program Element  
PEO - Program Executive Officer  
PM - Program Manager  
POE - Program Office Estimate  
RDT&E - Research, Development, Test, and Evaluation  
SAR - Selected Acquisition Report  
SCP - Service Cost Position  
TBD - To Be Determined  
TY - Then Year  
UCR - Unit Cost Reporting  
U.S. - United States  
USD(AT&L) - Under Secretary of Defense (Acquisition, Technology and Logistics)  
USD(A&S) - Under Secretary of Defense (Acquisition and Sustainment)

## Program Information

**Program Name**

CH-47F Modernized Cargo Helicopter (CH-47F Block II)

**DoD Component**

## Responsible Office

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**DSN Fax:**

**Date Assigned:** June 29, 2017

## References

**SAR Baseline (Development Estimate)**

Army Acquisition Executive (AAE) Approved Acquisition Program Baseline (APB) dated February 01, 2018

**Approved APB**

Army Acquisition Executive (AAE) Approved Acquisition Program Baseline (APB) dated February 1, 2018



## Mission and Description

The CH-47F Block II will support the Army's requirement to be strategically responsive across the full spectrum of operations. Its mission is transportation of ground forces, Class III/Class V supplies and other battle critical cargo in support of all future contingencies. With a significantly increased payload and operational reach, the CH-47F Block II will enable the Army to better support the rapid response capability necessary for forcible and early entry contingency missions, as well as tactical and operational nonlinear, noncontiguous, simultaneous or sequential operations, which will be characteristic of future operations. The CH-47F Block II is a future force system that supports Force 2025 and Beyond. As the Army's only heavy lift capability, the CH-47F Block II serves as a combat multiplier in the Multi-Domain Battle.

The CH-47F Block II acquisition program upgrades existing CH-47F aircraft and procures common hardware that exists between the CH-47F and MH-47G aircraft for Special Operations Forces. The CH-47F Block II program provides additional capability to the field with greater reach, increased payload capacity and an increase in maximum gross weight to 54,000-pounds. These improvements are based on airframe and subcomponent changes. Specifically, the Advanced Chinook Rotor Blades will significantly increase lift in high-hot conditions while improved flight control and drive train components will both significantly increase aircraft performance and reduce O&S costs. The program updates the Common Avionics Architecture System and Digital Advanced Flight Control System systems of the aircraft and incorporates other avionics changes introduced into the final CH-47F production lots. CH-47F Block II will also include a strengthened airframe which introduces significant commonality with the MH-47G and improvements to both the fuel and electrical systems which will both improve safety and reliability for the aircraft. Along with providing a significantly increased capability to the field, the program includes provisions for anticipated future upgrades as well as weight and cost savings initiatives to ensure the Army with a platform with the flexibility and performance needed to meet the needs of the future force until a Heavy Future Vertical Lift variant is available.



## Executive Summary

### Program Highlights Since Last Report

Funding in the FY 2020 PB is adequate to meet cost, schedule and performance of the EMD phase of the program. CH-47F Block II requirements are stable. Risk has not increased since the 2017 SAR. As a result of the \$1,326.7M reduction in acquisition funding in FY 2020 - FY 2024, Schedule, RDT&E Cost, and Acq O&M Cost deviations from the APB exist. A Program Deviation Report is in process.

On July 27, 2017 the Cargo Helicopters Project Manager awarded an EMD contract to the Boeing Company to begin the development effort for CH-47F Block II. Objectives of the CH-47F Block II Program include restoring the commander's payload, establishing a foundation for an affordable path to future upgrades, and converging U.S. Special Operations Command and Conventional H-47 designs.

Fuel System Rollover testing was completed on April 25, 2018. The Manufacturing Readiness Assessment review was completed on May 7, 2018. The Common Aviation Architecture System Formal Blue Label software version 10.1.4 was delivered on May 24, 2018. The first two Block II test aircraft were loaded on the main assembly line at Boeing Philadelphia on June 22, 2018 and August 27, 2018, three and ten days ahead of schedule, respectively. The Advanced Chinook Rotor Blade Demonstration Validation 2 began on August 27, 2018. Fuel Slosh and Vibe testing was completed on August 29, 2018. Emergency generator qualification testing was completed on September 4, 2018. The third Block II test aircraft was loaded on the main assembly line at Boeing Philadelphia on November 7, 2018, eight days ahead of schedule. The first flight test aircraft was received by the Delivery Center on February 19, 2019, approximately one month ahead of schedule.

There are no significant software-related issues with this program at this time.

History of Significant Developments Since Program Initiation	
History of Significant Developments Since Program Initiation	
Date	Significant Development Description
July 2017	The Army Acquisition Executive ADM approved Milestone B, authorizing the CH-47F Block II program to enter EMD and designating the CH-47F Block II as ACAT IC.
July 2017	The CH-47F Block II EMD contract was awarded to The Boeing Company.
December 2017	System Critical Design Review was completed.

### Threshold Breaches

#### APB Breaches

<b>Schedule</b>		<input checked="" type="checkbox"/>
<b>Performance</b>		<input type="checkbox"/>
<b>Cost</b>	RDT&E	<input checked="" type="checkbox"/>
	Procurement	<input type="checkbox"/>
	MILCON	<input type="checkbox"/>
	Acq O&M	<input checked="" type="checkbox"/>
<b>O&amp;S Cost</b>		<input type="checkbox"/>
<b>Unit Cost</b>	PAUC	<input type="checkbox"/>
	APUC	<input type="checkbox"/>

#### Explanation of Breach

Schedule: Funding in the FY 2020 PB reduces acquisition funding by \$1,276.7M FY 2020 - FY 2024. As a result of this significant reduction, sufficient funds are not available until FY 2027 to begin procurement of the CH-47F Block II LRIP aircraft. This delays the LRIP award from August 2021 to January 2027 causing delays to Initial Operational Test & Evaluation (IOT&E), IOC, and FRP contract award. This also extends the completion of production by six years.

Cost, RDT&E: Funding in the FY 2020 PB reduces RDT&E funding by \$70.7M FY 2020 - FY 2024. This reduction delays IOT&E until after CH-47F Block II LRIP aircraft are available. This delay necessitates additional RDT&E funding to address producibility issues rising from the production delay. This results in an APB RDT&E Cost deviation.

Cost, Acq O&M: Funding in the FY 2020 PB delays the CH-47F Block II LRIP award from August 2021 to January 2027, thereby extending the program six years and generating additional Acquisition-related O&M costs and an APB Acq O&M deviation.

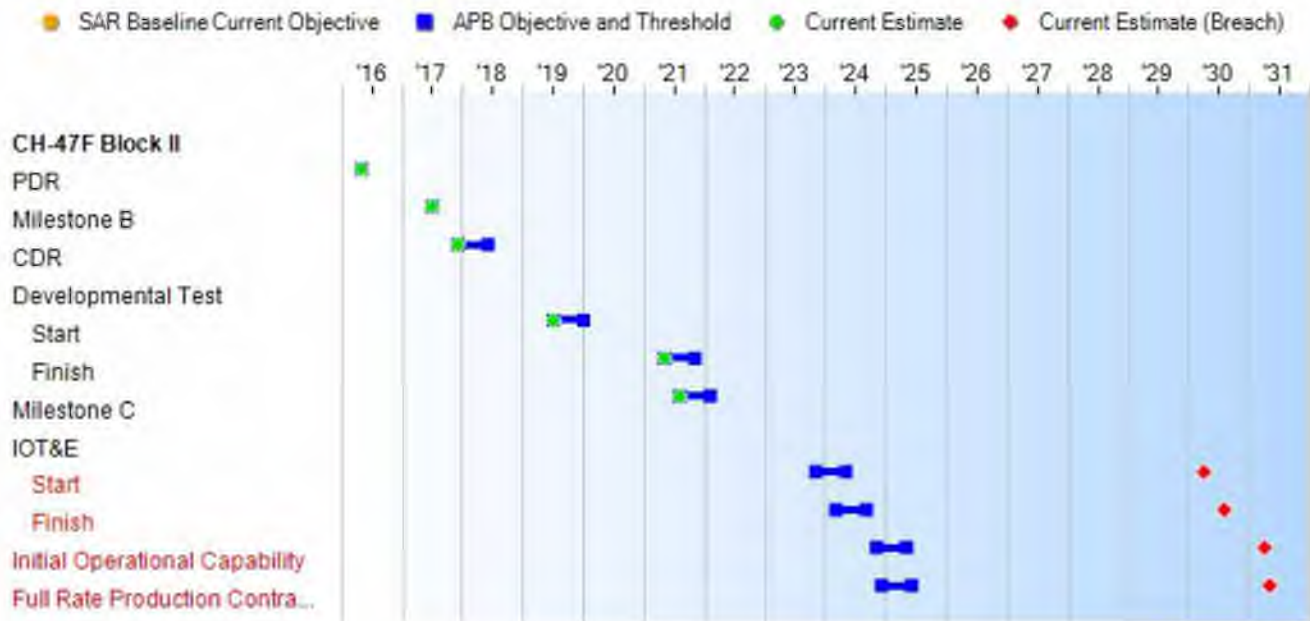
A Program Deviation Report is in process.

#### Nunn-McCurdy Breaches

<b>Current UCR Baseline</b>		
	PAUC	None
	APUC	None
<b>Original UCR Baseline</b>		
	PAUC	None
	APUC	None



### Schedule



Schedule Events				
Events	SAR Baseline Development Estimate	Current APB Development Objective/Threshold		Current Estimate
PDR	May 2016	May 2016	May 2016	May 2016
Milestone B	Jul 2017	Jul 2017	Jul 2017	Jul 2017
CDR	Dec 2017	Dec 2017	Jun 2018	Dec 2017
Developmental Test				
Start	Jul 2019	Jul 2019	Jan 2020	Jul 2019
Finish	May 2021	May 2021	Nov 2021	May 2021
Milestone C	Aug 2021	Aug 2021	Feb 2022	Aug 2021
IOT&E				
Start	Nov 2023	Nov 2023	May 2024	<b>Apr 2030<sup>1</sup></b> (Ch-1)
Finish	Mar 2024	Mar 2024	Sep 2024	<b>Aug 2030<sup>1</sup></b> (Ch-1)
Initial Operational Capability	Nov 2024	Nov 2024	May 2025	<b>Apr 2031<sup>1</sup></b> (Ch-1)
Full Rate Production Contract Award	Dec 2024	Dec 2024	Jun 2025	<b>May 2031<sup>1</sup></b> (Ch-1)

<sup>1</sup> APB Breach

**Change Explanations**

(Ch-1) The current estimates for IOT&E Start (November 2023 to April 2030), Finish (March 2024 to August 2030), IOC (November 2024 to April 2031), and FRP Contract Award (December 2024 to May 2031) changed from the last SAR due to an acquisition funding reduction of \$1,276.7M FY 2020 - FY 2024 in the FY 2020 PB.

**Notes**

Due to the acquisition funding reduction of \$1,276.7M FY 2020 - FY 2024 in the FY 2020 PB, IOT&E and subsequent milestones are delayed; sufficient funds are not available until FY 2027 to begin procurement of the CH-47F Block II LRIP aircraft. This delays the LRIP contract award from August 2021 to January 2027 causing delays to IOT&E, IOC, and FRP contract award. This also extends the completion of procurement by six years.

Developmental Test consists of Integrated Test and Limited User Test. Integrated Test begins with the start of baseline aircraft data collection.

**Acronyms and Abbreviations**

CDR - Critical Design Review  
IOT&E - Initial Operational Test & Evaluation  
PDR - Preliminary Design Review

## Performance

Performance Characteristics			
SAR Baseline Development Estimate	Current APB Development Objective/Threshold	Demonstrated Performance	Current Estimate
<b>Self-deploy with 30 minute fuel reserve (NM)</b>			
1260	1260	1056	1260
<b>Transport 16,000 lbs of internal/external cargo at 4K/95F with 30 minute reserve (NM)</b>			
100	100	50	100
<b>Transport combat equipped troops:</b>			
<b>Number of Troops</b>			
44	44	31	44
<b>Range (NM)</b>			
150	150	100	150
<b>Reliability:</b>			
<b>Mean Time Between Essential Maintenance Actions (MTBEMA) (flt hrs)</b>			
3.5	3.5	3.3	3.5
<b>Maintenance:</b>			
<b>Total Maintenance Ratio (mmh/flt hr)</b>			
9.2	9.2	9.8	9.2

### Requirements Reference

ORD Revision 4 dated January 26, 2006

### Change Explanations

None

### Acronyms and Abbreviations

F - Farenheit  
 flt - flight  
 hrs - hours  
 K - Kilometer  
 lbs - pounds  
 mmh - maintenance man hour  
 NM - nautical mile



### Track to Budget

#### RDT&E

Appn	BA	PE
Army	2040 07	0607137A

Project	Name
ES4	Chinook Product Improvement Program.

**Notes:** Funding for the CH-47F Block II program began in FY 2015.

#### Procurement

Appn	BA	PE
Army	2031 01	0210104A

Line Item	Name
A05105	CH-47 SLEP

**Notes:** Funding for the CH-47F Block II program began in FY 2017.

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Army	2031 02	0210104A
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Line Item	Name
AA0252	CH-47 Cargo Helicopter Mods

(Sunk)

#### Acq O&M

Appn	BA	PE
Army	2020 04	0702806A

Subactivity Group	Name
435	Acquisition and Management Support: Cargo Helicopter

(Shared)



## Cost and Funding

### Cost Summary

Total Acquisition Cost							
Appropriation	BY 2017 \$M			BY 2017 \$M	TY \$M		
	SAR Baseline Development Estimate	Current APB Development Objective/Threshold		Current Estimate	SAR Baseline Development Estimate	Current APB Development Objective	Current Estimate
RDT&E	766.2	766.2	842.8	848.7 <sup>1</sup>	815.8	815.8	942.3
Procurement	15208.8	15208.8	16729.7	16281.3	21425.2	21425.2	25495.5
Flyaway	--	--	--	15751.1	--	--	24667.4
Recurring	--	--	--	15511.6	--	--	24409.5
Non Recurring	--	--	--	239.5	--	--	257.9
Support	--	--	--	530.2	--	--	828.1
Other Support	--	--	--	483.8	--	--	749.3
Initial Spares	--	--	--	46.4	--	--	78.8
MILCON	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Acq O&M	244.8	244.8	269.3	309.3 <sup>1</sup>	327.7	327.7	448.0
Total	16219.8	16219.8	N/A	17439.3	22568.7	22568.7	26885.8

<sup>1</sup> APB Breach

#### Current APB Cost Estimate Reference

Army Cost Position dated April 05, 2017

#### Cost Notes

A revised Army Cost Position was completed on March 8, 2019 and identified the following program risks, the potential impacts of the risks on program cost, and approaches to mitigate the risks.

- 1) If the Block II aircraft weight is higher than expected, then there may be a potential risk to mission performance. Mitigation: Monitor aircraft weight growth, incentivize weight reduction in contract, review load and fatigue assumptions, and pursue weight reduction initiatives.
- 2) If H-47 industrial base is not kept in operation, then cost for H-47 production and support will increase. Mitigation: Use Indefinite Delivery Indefinite Quantity contract to sustain production line, support Technology Applications Program Office production and encourage Foreign Military Sales.
- 3) If completion of Advanced Chinook Rotor Blade qualification testing does not meet the Block II EMD schedule need date, then the completion of flight testing will be delayed. Mitigation: Execute qualification testing as required for EMD aircraft safety of flight release with available flight hours increasing as qualification testing is completed. Full qualification is accomplished at completion of EMD flight testing.
- 4) The FY 2019 DoD Appropriations Act reduced RDT&E funding by \$12.9M. This coupled with the \$32.7M FY 2018 reduction limits the ability to react to component or flight test deficiencies. Mitigation: Continue to realize targeted affordability efforts.

Total Quantity			
Quantity	SAR Baseline Development Estimate	Current APB Development	Current Estimate
RDT&E	3	3	3
Procurement	539	539	539
Total	542	542	542



## Cost and Funding

### Funding Summary

Appropriation Summary									
FY 2020 President's Budget / December 2018 SAR (TY\$ M)									
Appropriation	Prior	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	To Complete	Total
RDT&E	317.2	144.7	174.4	46.1	2.1	2.0	1.0	254.8	942.3
Procurement	387.0	140.1	183.5	179.3	166.1	183.7	194.4	24061.4	25495.5
MILCON	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Acq O&M	0.0	11.2	10.7	10.9	11.2	11.4	11.6	381.0	448.0
PB 2020 Total	704.2	296.0	368.6	236.3	179.4	197.1	207.0	24697.2	26885.8
PB 2019 Total	643.4	317.5	360.8	440.3	410.0	548.1	730.9	18986.2	22437.2
Delta	60.8	-21.5	7.8	-204.0	-230.6	-351.0	-523.9	5711.0	4448.6

#### Funding Notes

The FY 2019 DoD Appropriations Act reduced RDT&E funding by \$12.9M and Procurement funding by \$3.5M.

The FY 2020 PB request is sufficient to fund the EMD contract and requirements; it delays the LRIP award from FY 2021 to FY 2027. The delay necessitates additional RDT&E efforts to address producibility issues rising from the production delay. This will result in RDT&E and Acq O&M cost deviations in the APB.

Quantity Summary										
FY 2020 President's Budget / December 2018 SAR (TY\$ M)										
Quantity	Undistributed	Prior	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	To Complete	Total
Development	3	0	0	0	0	0	0	0	0	3
Production	0	8	7	9	6	6	6	6	491	539
PB 2020 Total	3	8	7	9	6	6	6	6	491	542
PB 2019 Total	3	4	7	8	13	13	17	21	456	542
Delta	0	4	0	1	-7	-7	-11	-15	35	0

## Cost and Funding

### Annual Funding By Appropriation

Annual Funding							
2040   RDT&E   Research, Development, Test, and Evaluation, Army							
Fiscal Year	Quantity	TY \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2015	--	--	--	--	--	--	35.2
2016	--	--	--	--	--	--	38.3
2017	--	--	--	--	--	--	88.3
2018	--	--	--	--	--	--	155.4
2019	--	--	--	--	--	--	144.7
2020	--	--	--	--	--	--	174.4
2021	--	--	--	--	--	--	46.1
2022	--	--	--	--	--	--	2.1
2023	--	--	--	--	--	--	2.0
2024	--	--	--	--	--	--	1.0
2025	--	--	--	--	--	--	--
2026	--	--	--	--	--	--	50.0
2027	--	--	--	--	--	--	50.0
2028	--	--	--	--	--	--	45.0
2029	--	--	--	--	--	--	40.5
2030	--	--	--	--	--	--	36.5
2031	--	--	--	--	--	--	32.8
Subtotal	3	--	--	--	--	--	942.3

Annual Funding							
2040   RDT&E   Research, Development, Test, and Evaluation, Army							
Fiscal Year	Quantity	BY 2017 \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2015	--	--	--	--	--	--	35.2
2016	--	--	--	--	--	--	38.0
2017	--	--	--	--	--	--	85.7
2018	--	--	--	--	--	--	148.3
2019	--	--	--	--	--	--	136.0
2020	--	--	--	--	--	--	160.4
2021	--	--	--	--	--	--	41.6
2022	--	--	--	--	--	--	1.9
2023	--	--	--	--	--	--	1.7
2024	--	--	--	--	--	--	0.8
2025	--	--	--	--	--	--	--
2026	--	--	--	--	--	--	40.8
2027	--	--	--	--	--	--	40.0
2028	--	--	--	--	--	--	35.3
2029	--	--	--	--	--	--	31.2
2030	--	--	--	--	--	--	27.5
2031	--	--	--	--	--	--	24.3
Subtotal	3	--	--	--	--	--	848.7

The FY 2019 DoD Appropriations Act reduced RDT&E funding by \$12.9M.

Funding in the FY 2020 PB reduces RDT&E funding by \$70.7M FY 2020 - FY 2024. This reduction delays IOT&E until after CH-47F Block II LRIP aircraft are available. This delay necessitates additional RDT&E funding to address producibility issues rising from the production delay. This results in an APB RDT&E Cost deviation.



Annual Funding							
2031   Procurement   Aircraft Procurement, Army							
Fiscal Year	Quantity	TY \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2015	--	--	--	102.2	102.2	--	102.2
2016	--	--	--	43.7	43.7	--	43.7
2017	--	8.7	10.6	33.2	52.5	--	52.5
2018	8	184.1	--	4.5	188.6	--	188.6
2019	7	140.1	--	--	140.1	--	140.1
2020	9	183.5	--	--	183.5	--	183.5
2021	6	179.3	--	--	179.3	--	179.3
2022	6	166.1	--	--	166.1	--	166.1
2023	6	183.7	--	--	183.7	--	183.7
2024	6	194.4	--	--	194.4	--	194.4
2025	6	210.7	4.7	--	215.4	0.6	216.0
2026	6	213.1	5.6	--	218.7	1.1	219.8
2027	11	451.8	20.8	58.6	531.2	1.7	532.9
2028	8	354.8	26.4	15.0	396.2	2.8	399.0
2029	9	391.0	35.8	0.3	427.1	11.6	438.7
2030	13	526.8	46.8	0.3	573.9	20.8	594.7
2031	16	630.0	55.6	--	685.6	32.9	718.5
2032	18	706.9	63.3	0.1	770.3	65.7	836.0
2033	24	919.4	71.4	--	990.8	78.8	1069.6
2034	24	935.5	73.6	--	1009.1	64.0	1073.1
2035	24	953.4	74.2	--	1027.6	64.6	1092.2
2036	24	972.7	76.6	--	1049.3	75.2	1124.5
2037	24	991.6	77.1	--	1068.7	49.3	1118.0
2038	24	1010.3	79.6	--	1089.9	34.5	1124.4
2039	24	1024.1	80.0	--	1104.1	36.3	1140.4
2040	24	1044.9	82.6	--	1127.5	31.6	1159.1
2041	24	1067.2	83.3	--	1150.5	33.1	1183.6
2042	24	1083.8	85.8	--	1169.6	33.5	1203.1
2043	24	1106.0	86.5	--	1192.5	23.6	1216.1
2044	24	1123.1	89.1	--	1212.2	25.8	1238.0
2045	24	1145.2	89.7	--	1234.9	27.4	1262.3
2046	24	1170.0	88.6	--	1258.6	28.6	1287.2
2047	24	1196.3	83.8	--	1280.1	28.5	1308.6
2048	24	1224.3	79.7	--	1304.0	28.3	1332.3
2049	20	1074.9	70.6	--	1145.5	27.8	1173.3
Subtotal	539	22767.7	1641.8	257.9	24667.4	828.1	25495.5



Annual Funding							
2031   Procurement   Aircraft Procurement, Army							
Fiscal Year	Quantity	BY 2017 \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2015	--	--	--	101.9	101.9	--	101.9
2016	--	--	--	43.0	43.0	--	43.0
2017	--	8.4	10.2	32.0	50.6	--	50.6
2018	8	173.9	--	4.2	178.1	--	178.1
2019	7	129.5	--	--	129.5	--	129.5
2020	9	166.3	--	--	166.3	--	166.3
2021	6	159.3	--	--	159.3	--	159.3
2022	6	144.7	--	--	144.7	--	144.7
2023	6	156.9	--	--	156.9	--	156.9
2024	6	162.8	--	--	162.8	--	162.8
2025	6	173.0	3.8	--	176.8	0.5	177.3
2026	6	171.5	4.5	--	176.0	0.9	176.9
2027	11	356.5	16.4	46.3	419.2	1.3	420.5
2028	8	274.4	20.4	11.6	306.4	2.2	308.6
2029	9	296.5	27.2	0.2	323.9	8.8	332.7
2030	13	391.7	34.7	0.2	426.6	15.5	442.1
2031	16	459.2	40.5	--	499.7	24.0	523.7
2032	18	505.2	45.2	0.1	550.5	46.9	597.4
2033	24	644.1	50.0	--	694.1	55.3	749.4
2034	24	642.6	50.5	--	693.1	44.0	737.1
2035	24	642.0	50.0	--	692.0	43.5	735.5
2036	24	642.2	50.5	--	692.7	49.7	742.4
2037	24	641.8	49.9	--	691.7	31.9	723.6
2038	24	641.1	50.5	--	691.6	21.9	713.5
2039	24	637.1	49.8	--	686.9	22.6	709.5
2040	24	637.3	50.5	--	687.8	19.2	707.0
2041	24	638.1	49.8	--	687.9	19.8	707.7
2042	24	635.4	50.3	--	685.7	19.6	705.3
2043	24	635.7	49.7	--	685.4	13.5	698.9
2044	24	632.8	50.3	--	683.1	14.5	697.6
2045	24	632.6	49.6	--	682.2	15.1	697.3
2046	24	633.7	47.9	--	681.6	15.5	697.1
2047	24	635.2	44.5	--	679.7	15.1	694.8
2048	24	637.3	41.5	--	678.8	14.7	693.5
2049	20	548.6	36.0	--	584.6	14.2	598.8
Subtotal	539	14487.4	1024.2	239.5	15751.1	530.2	16281.3

The FY 2019 DoD Appropriations Act reduced procurement funding by \$3.5M.

Funding in the FY 2020 PB reduces Procurement funding by \$1,276.7M FY 2020 - FY 2024. As a result of this significant reduction, sufficient funds are not available until FY 2027 to begin production of the CH-47F Block II LRIP aircraft. This delays the LRIP award from August 2021 to January 2027 causing delays to IOT&E, IOC, and FRP contract award. This also extends the completion of procurement by six years.

The FY 2021 funding and quantity position includes a duplicate \$25M and one additional aircraft. The correct number of aircraft procured in FY 2021 is six aircraft.

Cost Quantity Information		
2031   Procurement   Aircraft Procurement, Army		
Fiscal Year	Quantity	End Item Recurring Flyaway (Aligned With Quantity) BY 2017 \$M
2015	--	--
2016	--	--
2017	--	--
2018	8	164.1
2019	7	127.3
2020	9	173.4
2021	6	161.0
2022	6	145.9
2023	6	158.2
2024	6	164.2
2025	6	172.7
2026	6	171.1
2027	11	373.6
2028	8	282.9
2029	9	296.5
2030	13	391.7
2031	16	459.2
2032	18	505.2
2033	24	644.3
2034	24	642.6
2035	24	642.0
2036	24	642.2
2037	24	641.8
2038	24	641.1
2039	24	637.1
2040	24	637.3
2041	24	638.1
2042	24	635.4
2043	24	635.7
2044	24	632.8
2045	24	632.6
2046	24	633.7
2047	24	635.2
2048	24	637.3
2049	20	531.2
Subtotal	539	14487.4

Annual Funding		
2020	Acq O&M	Operation and Maintenance, Army
Fiscal Year	TY \$M	
	Total Program	
2019		11.2
2020		10.7
2021		10.9
2022		11.2
2023		11.4
2024		11.6
2025		11.9
2026		12.1
2027		12.4
2028		12.6
2029		12.9
2030		13.1
2031		13.4
2032		13.7
2033		13.9
2034		14.2
2035		14.5
2036		14.8
2037		15.1
2038		15.4
2039		15.7
2040		16.0
2041		16.3
2042		16.7
2043		17.0
2044		17.3
2045		17.7
2046		18.0
2047		18.4
2048		18.8
2049		19.1
Subtotal		448.0

Annual Funding 2020   Acq O&M   Operation and Maintenance, Army		
Fiscal Year	BY 2017 \$M	
	Total Program	
2019		10.5
2020		9.9
2021		9.9
2022		10.0
2023		9.9
2024		9.9
2025		10.0
2026		9.9
2027		10.0
2028		9.9
2029		10.0
2030		9.9
2031		10.0
2032		10.0
2033		9.9
2034		10.0
2035		10.0
2036		10.0
2037		10.0
2038		10.0
2039		10.0
2040		10.0
2041		9.9
2042		10.0
2043		10.0
2044		9.9
2045		10.0
2046		9.9
2047		10.0
2048		10.0
2049		9.9
Subtotal		309.3



Funding in the FY 2020 PB delays the CH-47F Block II LRIP award from August 2021 to January 2027, thereby extending the program six years and generating additional Acq O&M costs and an APB deviation.

## **Low Rate Initial Production**

There is no LRIP for this program.



## **Foreign Military Sales**

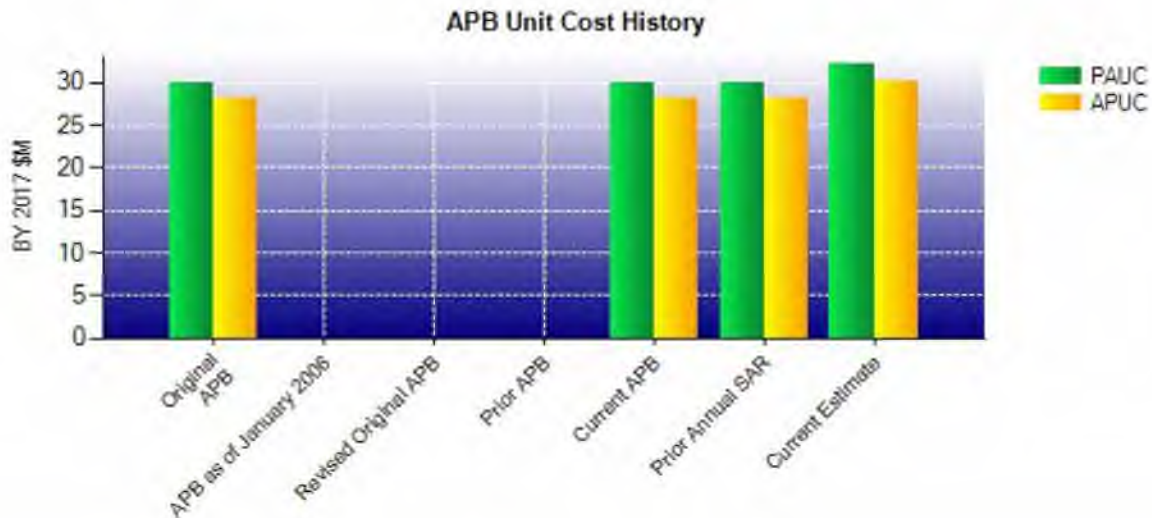
None

## **Nuclear Costs**

None

**Unit Cost**

Current UCR Baseline and Current Estimate (Base-Year Dollars)			
Item	BY 2017 \$M	BY 2017 \$M	% Change
	Current UCR Baseline (Feb 2018 APB)	Current Estimate (Dec 2018 SAR)	
<b>Program Acquisition Unit Cost</b>			
Cost	16219.8	17439.3	
Quantity	542	542	
Unit Cost	29.926	32.176	+7.52
<b>Average Procurement Unit Cost</b>			
Cost	15208.8	16281.3	
Quantity	539	539	
Unit Cost	28.217	30.206	+7.05
Original UCR Baseline and Current Estimate (Base-Year Dollars)			
Item	BY 2017 \$M	BY 2017 \$M	% Change
	Original UCR Baseline (Feb 2018 APB)	Current Estimate (Dec 2018 SAR)	
<b>Program Acquisition Unit Cost</b>			
Cost	16219.8	17439.3	
Quantity	542	542	
Unit Cost	29.926	32.176	+7.52
<b>Average Procurement Unit Cost</b>			
Cost	15208.8	16281.3	
Quantity	539	539	
Unit Cost	28.217	30.206	+7.05



APB Unit Cost History					
Item	Date	BY 2017 \$M		TY \$M	
		PAUC	APUC	PAUC	APUC
Original APB	Feb 2018	29.926	28.217	41.640	39.750
APB as of January 2006	N/A	N/A	N/A	N/A	N/A
Revised Original APB	N/A	N/A	N/A	N/A	N/A
Prior APB	N/A	N/A	N/A	N/A	N/A
Current APB	Feb 2018	29.926	28.217	41.640	39.750
Prior Annual SAR	Dec 2017	29.934	28.216	41.397	39.511
Current Estimate	Dec 2018	32.176	30.206	49.605	47.301

### SAR Unit Cost History

Current SAR Baseline to Current Estimate (TY \$M)									
PAUC Development Estimate	Changes								PAUC Current Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
41.640	0.148	0.000	5.761	0.063	1.646	0.000	0.347	7.965	49.605

Current SAR Baseline to Current Estimate (TY \$M)									
Initial APUC Development Estimate	Changes								APUC Current Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
39.750	0.146	0.000	5.244	0.063	1.750	0.000	0.349	7.552	47.301

SAR Baseline History				
Item	SAR Planning Estimate	SAR Development Estimate	SAR Production Estimate	Current Estimate
Milestone A	N/A	N/A	N/A	N/A
Milestone B	N/A	Jul 2017	N/A	Jul 2017
Milestone C	N/A	Aug 2021	N/A	Aug 2021
IOC	N/A	Nov 2024	N/A	Apr 2031
Total Cost (TY \$M)	N/A	22568.7	N/A	26885.8
Total Quantity	N/A	542	N/A	542
PAUC	N/A	41.640	N/A	49.605



**Cost Variance**

Summary TY \$M					
Item	RDT&E	Procurement	MILCON	Acq O&M	Total
SAR Baseline (Development Estimate)	815.8	21425.2	--	327.7	22568.7
Previous Changes					
Economic	-7.2	-124.7	--	-0.7	-132.6
Quantity	--	--	--	--	--
Schedule	--	-4.1	--	--	-4.1
Engineering	--	--	--	--	--
Estimating	+2.6	+0.5	--	+2.8	+5.9
Other	--	--	--	--	--
Support	--	-0.7	--	--	-0.7
<b>Subtotal</b>	<b>-4.6</b>	<b>-129.0</b>	<b>--</b>	<b>+2.1</b>	<b>-131.5</b>
Current Changes					
Economic	+7.5	+203.3	--	+1.8	+212.6
Quantity	--	--	--	--	--
Schedule	+179.8	+2830.7	--	+116.5	+3127.0
Engineering	--	+33.9	--	--	+33.9
Estimating	-56.2	+942.7	--	-0.1	+886.4
Other	--	--	--	--	--
Support	--	+188.7	--	--	+188.7
<b>Subtotal</b>	<b>+131.1</b>	<b>+4199.3</b>	<b>--</b>	<b>+118.2</b>	<b>+4448.6</b>
<b>Total Changes</b>	<b>+126.5</b>	<b>+4070.3</b>	<b>--</b>	<b>+120.3</b>	<b>+4317.1</b>
CE - Cost Variance	942.3	25495.5	--	448.0	26885.8
CE - Cost & Funding	942.3	25495.5	--	448.0	26885.8

Summary BY 2017 \$M					
Item	RDT&E	Procurement	MILCON	Acq O&M	Total
SAR Baseline (Development Estimate)	766.2	15208.8	--	244.8	16219.8
Previous Changes					
Economic	--	--	--	--	--
Quantity	--	--	--	--	--
Schedule	--	--	--	--	--
Engineering	--	--	--	--	--
Estimating	+2.5	-0.1	--	+2.5	+4.9
Other	--	--	--	--	--
Support	--	-0.3	--	--	-0.3
Subtotal	+2.5	-0.4	--	+2.5	+4.6
Current Changes					
Economic	--	--	--	--	--
Quantity	--	--	--	--	--
Schedule	+133.5	+346.2	--	+62.1	+541.8
Engineering	--	+31.7	--	--	+31.7
Estimating	-53.5	+628.7	--	-0.1	+575.1
Other	--	--	--	--	--
Support	--	+66.3	--	--	+66.3
Subtotal	+80.0	+1072.9	--	+62.0	+1214.9
Total Changes	+82.5	+1072.5	--	+64.5	+1219.5
CE - Cost Variance	848.7	16281.3	--	309.3	17439.3
CE - Cost & Funding	848.7	16281.3	--	309.3	17439.3

Previous Estimate: December 2017



RDT&E	\$M	
Current Change Explanations	Base Year	Then Year
Revised escalation indices. (Economic)	N/A	+7.5
Schedule variance due to halting the EMD phase with the completion of Developmental Test in FY 2021 and delaying the remaining scope to resume in FY 2027. (Schedule)	+133.5	+179.8
Adjustment for current and prior escalation. (Estimating)	-3.7	-3.9
Revised estimate to reflect actuals. (Estimating)	-49.8	-52.3
<b>RDT&amp;E Subtotal</b>	<b>+80.0</b>	<b>+131.1</b>

Procurement	\$M	
Current Change Explanations	Base Year	Then Year
Revised escalation indices. (Economic)	N/A	+203.3
Schedule variance due to extension of program buy profile. (Subtotal)	+346.2	+2830.7
Net change of procurement buy profile due to extension of production schedule to FY 2049. (Schedule)	(0.0)	(+2141.1)
Additional schedule variance due to differing unit costs for MH-47G and CH-47F Block II variants. (Schedule)	(+346.2)	(+689.6)
Upgrade of five MH-47Gs from ReNew to New Build. (Engineering)	+31.7	+33.9
Adjustment for current and prior escalation. (Estimating)	-2.9	-3.0
Decreased estimate to reflect actuals. (Estimating)	-7.7	-8.4
Increased estimate to reflect rate penalty due to below economic rate of production quantities. (Estimating)	+416.5	+510.7
Increased Systems Engineering Program/Management estimate to add seven additional years due to extension of production schedule. (Estimating)	+268.1	+490.3
Decreased estimate for production tooling due to decrease in maximum production rate. (Estimating)	-45.3	-46.9
Increase in Other Support for cost of hardware. (Support)	+65.7	+178.3
Increase in Initial Spares for cost of hardware. (Support)	+0.6	+10.4
<b>Procurement Subtotal</b>	<b>+1072.9</b>	<b>+4199.3</b>

Acq O&M	\$M	
Current Change Explanations	Base Year	Then Year
Revised escalation indices. (Economic)	N/A	+1.8
Schedule variance due to extension of end of the acquisition program from FY 2042 to FY 2049. (Schedule)	+62.1	+116.5
Adjustment for current and prior escalation. (Estimating)	-0.1	-0.1
<b>Acq O&amp;M Subtotal</b>	<b>+62.0</b>	<b>+118.2</b>



## Contracts

### Contract Identification

**Appropriation:** RDT&E  
**Contract Name:** EMD  
**Contractor:** The Boeing Company  
**Contractor Location:** Route 291 & Stewart Ave.  
 Ridley Park, PA 19078-1099  
**Contract Number:** W58RGZ-17-C-0059  
**Contract Type:** Cost Plus Incentive Fee (CPIF)  
**Award Date:** July 27, 2017  
**Definitization Date:** July 27, 2017

### Contract Price

Initial Contract Price (\$M)			Current Contract Price (\$M)			Estimated Price At Completion (\$M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
269.5	N/A	N/A	263.0	N/A	4	263.0	263.0

### Target Price Change Explanation

The difference between the Initial Contract Price Target and the Current Contract Price Target is due to minor modifications.

### Contract Variance

Item	Cost Variance	Schedule Variance
Cumulative Variances To Date (1/17/2019)	+3.8	-0.9
Previous Cumulative Variances	+1.5	-2.5
Net Change	+2.3	+1.6

### Cost and Schedule Variance Explanations

The favorable net change in the cost variance is due to a stable and fully functioning production line that enables efficient manufacturing.

The favorable net change in the schedule variance is due to the completion of the first Block II test aircraft ahead of schedule.

**Contract Identification**

**Appropriation:** RDT&E  
**Contract Name:** Improved Drive Train Phase II  
**Contractor:** The Boeing Company  
**Contractor Location:** Route 291 & Stewart Ave  
 Ridley Park, PA 19078-1099  
**Contract Number:** W58RGZ-14-D-0075/8  
**Contract Type:** Cost Plus Fixed Fee (CPFF)  
**Award Date:** November 20, 2015  
**Definitization Date:** November 20, 2015

**Contract Price**

Initial Contract Price (\$M)			Current Contract Price (\$M)			Estimated Price At Completion (\$M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
49.1	N/A	0	49.1	N/A	0	47.1	47.1

**Contract Variance**

Item	Cost Variance	Schedule Variance
Cumulative Variances To Date (2/12/2019)	-3.4	-4.3
Previous Cumulative Variances	-0.7	-4.4
Net Change	-2.7	+0.1

**Cost and Schedule Variance Explanations**

The unfavorable net change in the cost variance is due to development activities in first time manufacturability of C61 ferium steel.

The favorable net change in the schedule variance is due to completion of test activities.



**Contract Identification**

**Appropriation:** RDT&E  
**Contract Name:** Electrical Avionics Structural Integration (EASI)  
**Contractor:** The Boeing Company  
**Contractor Location:** Route 291 & Stewart Ave  
 Ridley Park, PA 19078-1099  
**Contract Number:** W58RGZ-14-D-0075/26  
**Contract Type:** Cost Plus Fixed Fee (CPFF)  
**Award Date:** November 20, 2015  
**Definitization Date:** November 20, 2015

**Contract Price**

Initial Contract Price (\$M)			Current Contract Price (\$M)			Estimated Price At Completion (\$M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
44.8	N/A	0	46.9	N/A	0	43.1	43.1

**Target Price Change Explanation**

The difference between the Initial Contract Price Target and the Current Contract Price Target is due to miscellaneous scope changes.

**Contract Variance**

Item	Cost Variance	Schedule Variance
Cumulative Variances To Date (2/12/2019)	+1.4	0.0
Previous Cumulative Variances	-1.5	-0.6
Net Change	+2.9	+0.6

**Cost and Schedule Variance Explanations**

The favorable net change in the cost variance is due to fewer hours spent than budgeted.

The favorable net change in the schedule variance is due to all remaining task activities nearing completion prior to the end of the period of performance in April 2019.

**Notes**

This contract is more than 90% complete; therefore, this is the final report for this contract.

**Contract Identification**

**Appropriation:** RDT&E  
**Contract Name:** ACRB NRE  
**Contractor:** The Boeing Company  
**Contractor Location:** Route 291 & Stewart Ave  
 Ridley Park, PA 19078-1099  
**Contract Number:** W58RGZ-14-D-0075/42  
**Contract Type:** Cost Plus Fixed Fee (CPFF)  
**Award Date:** April 15, 2016  
**Definitization Date:** April 15, 2016

**Contract Price**

Initial Contract Price (\$M)			Current Contract Price (\$M)			Estimated Price At Completion (\$M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
51.3	N/A	0	61.8	N/A	0	68.4	68.4

**Target Price Change Explanation**

The difference between the Initial Contract Price Target and the Current Contract Price Target is due to contract ceiling increase due to contractor overrun.

**Contract Variance**

Item	Cost Variance	Schedule Variance
Cumulative Variances To Date (2/19/2019)	+0.7	-1.6
Previous Cumulative Variances	--	--
Net Change	+0.7	-1.6

**Cost and Schedule Variance Explanations**

The favorable cumulative cost variance is due to fewer engineering hours being expended than budgeted.

The unfavorable cumulative schedule variance is due to design improvement efforts and test schedule delays.

**Notes**

This is the first time this contract is being reported.

This contract was previously reported with the erroneous contract number W58RGZ-14-D-0014.



## Deliveries and Expenditures

Deliveries				
Delivered to Date	Planned to Date	Actual to Date	Total Quantity	Percent Delivered
Development	0	0	3	0.00%
Production	0	0	539	0.00%
Total Program Quantity Delivered	0	0	542	0.00%

Expended and Appropriated (TY \$M)			
Total Acquisition Cost	26885.8	Years Appropriated	5
Expended to Date	305.8	Percent Years Appropriated	14.29%
Percent Expended	1.14%	Appropriated to Date	1000.2
Total Funding Years	35	Percent Appropriated	3.72%

The above data is current as of March 11, 2019.

## Operating and Support Cost

### Cost Estimate Details

<b>Date of Estimate:</b>	March 08, 2019
<b>Source of Estimate:</b>	SCP
<b>Quantity to Sustain:</b>	470
<b>Unit of Measure:</b>	Aircraft
<b>Service Life per Unit:</b>	25.00 Years
<b>Fiscal Years in Service:</b>	FY 2038 - FY 2074

The costs are taken from the April 2017 SCP updated with fact-of-life changes as of March 2019. It assumes an end state of 470 CH-47F Block II aircraft when fully fielded with an Operational tempo (OPTEMPO) of 174 peacetime flying hours per operational aircraft. While the common production costs of 69 MH-47Gs are included in the Procurement costs, they are excluded from the O&S costs as they are managed by Special Operations Aviation Regiment. The remaining aircraft are three RDT&E-funded aircraft that incur no O&S costs.

### Sustainment Strategy

The CH-47F Block II weapon system follows the standard two-level Army maintenance program: Field and Sustainment. Field maintenance is performed by Combat Aviation Brigade personnel assigned to flight companies, aviation maintenance companies, and aviation support companies. Sustainment maintenance is divided and primarily performed by three separate entities: the Original Equipment Manufacturers (OEM) and contractor field service representatives; Army depots located at fixed bases in the continental United States; and by the national maintenance sources of repair.

CH-47F Block II costs are based on CH-47F actual extracted from the O&S Management Information System (OSMIS). To calculate the CH-47F Block II costs, the CH-47F costs were adjusted by a factor to account for the increased reliability of modified parts.

### Antecedent Information

The antecedent to the CH-47F Block II is the CH-47F, for which O&S costs are from the CH-47F SAR. The total O&S cost is based on 449 operational aircraft with a service life of 20 years peacetime OPTEMPO from FY 2007 through FY 2040. The reported CH-47F costs match the December 2017 CH-47F SAR, revised to BY 2017 dollars.

Cost Element	Annual O&S Costs BY2017 \$M	
	CH-47F Block II Average Annual Cost Per Aircraft	CH-47F (Antecedent) Average Annual Cost Per Aircraft
Unit-Level Manpower	0.517	0.496
Unit Operations	0.250	0.085
Maintenance	0.749	1.430
Sustaining Support	0.010	0.023
Continuing System Improvements	0.220	0.256
Indirect Support	0.111	0.122
Other	0.000	0.000
<b>Total</b>	<b>1.857</b>	<b>2.412</b>



Item	Total O&S Cost \$M			
	CH-47F Block II			CH-47F (Antecedent)
	Current Development APB Objective/Threshold		Current Estimate	
<b>Base Year</b>	21737.0	23910.7	21805.2	21668.1
<b>Then Year</b>	40118.6	N/A	44806.2	N/A

#### Equation to Translate Annual Cost to Total Cost

Total cost = Average annual cost per aircraft x quantity x service life = \$1.857M \* 470 \* 25

O&S Cost Variance		
Category	BY 2017 \$M	Change Explanations
Prior SAR Total O&S Estimates - Dec 2017 SAR	21737.0	
Programmatic/Planning Factors	0.0	
Cost Estimating Methodology	68.2	Increased estimate for Post Production Modifications due to increased procurement cost of aircraft. Revised escalation indices.
Cost Data Update	0.0	
Labor Rate	0.0	
Energy Rate	0.0	
Technical Input	0.0	
Other	0.0	
<b>Total Changes</b>	<b>68.2</b>	
Current Estimate	21805.2	

#### Disposal Estimate Details

Date of Estimate: April 24, 2017  
Source of Estimate: SCP  
Disposal/Demilitarization Total Cost (BY 2017 \$M): 298.9